

# Diet in Dengue

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## Abstract

Dengue is an acute viral infection spread by mosquitoes with potential fatal complications. Dengue fever is a kind of flu type illness otherwise called as break bone fever as it causes severe pain in the joints. Good nutritional status, increased appetite balanced electrolytes and increase RBC count along with diet therapy is an important remedy helpful in recovering from dengue. The literature reviewed was identified using various searches in PubMed, WorldCat, and Google Scholar as well as citation tracking on original research articles related to Dengue.

**Keywords:** Dengue, Viral infection, Diet therapy

## Introduction

Dengue virus (DENV), a member of the Flaviviridae family, causing the most widespread mosquito-borne viral infection in humans around the world today. DENV is a single positive-stranded RNA virus transmitted by the mosquitoes *Aedes aegypti* and *Ae. albopictus* [1].

DENV infection can result in either asymptomatic infection or mild undifferentiated fever, or it can take one of three clinical manifestations in humans: dengue fever (DF), dengue hemorrhagic fever

(DHF), and dengue shock syndrome (DSS). The three clinical manifestations of the disease differ in the severity of their symptoms, with the flu-like DF being the least severe and DSS being the most severe. In most cases, the mild febrile DF is not fatal; the infection turning into DHF or DSS, however, can be life-threatening and causes mortality in many cases [2].

Major disease manifestations in the body include reduction in platelets count, since they are important in blood coagulation it is difficult to stop bleeding with low platelets. Host nutritional status is a strong predictor of immunity [3].

## Micronutrient

Micronutrient supplements represent a low-cost and simple adjuncts in the treatment and success of patients with dengue.

Vitamin D has been shown to promote both innate and adaptive immunity through a number of mechanisms, Vitamin D binding to the vitamin D receptor (VDR), in turn, activates vitamin D-responsive genes in the body, many of which induce a number of pathogen-fighting mechanisms. The highest concentration of 1,25-dihydroxy vitamin D<sub>3</sub> (10 µM) induced the greatest reduction in percentage of infected cells, suggesting a correlation between vitamin D<sub>3</sub> dose and inhibition of DENV infection [4].

Zinc is an important micro nutrient for immune function, zinc deficiency has been associated with decreased resistance to viral infection. zinc specifically influences lymphocyte maturation, cytokine production, and generation of free radicals while maintaining normal macrophage and natural killer (NK) cell activity in the immune response; it also plays a role in T-cell and neutrophil activity as well as B-cell development [5].

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Yuliana and others found that a decrease in zinc levels associated with increasing severity of DENV infection [6].

Vitamin A supplementation has been found to have a significant impact on preventing morbidity and mortality in a number of infectious diseases in developing countries. Studies show that vitamin A supplementation decreases disease severity and risk of death in malaria and reduces mortality in measles. Vitamin A affects the activity of macrophages and the number and activity of NK cells as well as lymphocyte functions, such as B-cell proliferation and T-cell activation [7].

Iron deficiency has been found to decrease mitogen responsiveness, NK cell activity, lymphocyte bactericidal activity, and neutrophil phagocytic activity while influencing cytokine activity in every stage of the immune response to infection [8].

The antioxidant properties of vitamin E protect immune cell membranes from oxidative damage. Vitamin E supplementation has been reported to enhance both humoral- and cell-mediated immune responses and resistance to infection in a number of human studies [9].

Vitamin E has been shown to mitigate oxidative stress and leukopenia in previous laboratory studies [10] which suggests possible mechanisms by which vitamin E supplementation can reduce clinical severity of DENV infection.

Chromium has been discovered to affect the immune response by influencing T and B lymphocytes, antigen-presenting cells (such as macrophages), and cytokine production. Shrivastava and others studied the effect of hexavalent chromium on DENV infection in mice. First exposed the experimental group to Cr (VI) and then infected both groups with DENV, and they found that exposure to Cr (VI) significantly helped minimize the effects of infection [11].

As dengue majorly affects the liver, there is impaired liver function. The appetite of the patient is very low to support medical therapy hence it becomes very important to supply body with easy to digest food where in liver can rest and regenerate its cells. It becomes mandatory to select foods which patient likes. Calorie dense foods with good consistency is very important. Some foods have remarkable properties that can help the patient to a great extent. Diet plays an important role in the recovery from dengue fever. The main principle in diet therapy is to boost the production of platelets and white blood cells [12].

#### *Diet therapy*

1. Oats and multi grain bread can be eaten as it provides energy and fiber when body needs recovery after fever.
2. High protein diet needs to restore all the resources of vitamins, minerals, proteins and fats in the body. Dairy products, eggs, cereals, chicken, and fish are highly recommended foods for protein diet.
3. Coloured vegetables in diet-polyphenols [13].
  - Carrots are rich in beta-carotene, which help to improve the immunity cells that kill the viruses. It also contains vitamin B<sub>6</sub> which increases the production of antibodies.
  - Beetroots are rich in anthocyanins vitamin (B<sub>9</sub>, Vitamin C), minerals (manganese, potassium, iron) these are very helpful in increasing the RBC count.
  - Green leafy vegetables like spinach are also rich in vitamin K, potassium and iron. It is also rich in phytonutrients like beta carotene and Lutein zeaxanthin etc that helps in retrieving the immunity and platelets.
  - Tomatoes are rich in vitamin C, potassium and lycopene pigments.
  - Garlic contains sulfur-containing compounds, which helps white blood cells to grow fast.
  - Mushrooms help to regain WBCs and enhance its property.

#### *4. Fruits [14]*

- Vitamin C containing fruits are very effective in recovery of dengue. Lemon is the very good source of vitamin C so lemon water was very helpful in detoxifying the body. Other fruits are, orange, kiwi, papaya, watermelon and dragon fruits.
- Papaya is the best known fruit during dengue fever as it enhances the levels of platelets in the body. This can also be taken as juice, Ayurveda recommends extracts prepared by crushing the leaves of papaya. Ayurveda recommends intake of 2 tablespoons of papaya leaf juice in the morning and evening.
- Dragon fruit are rich source of vitamin C, improve cellular immunity and prevents dengue hemorrhagic fever. The fruit helps to boost haemoglobin production.

- The antioxidant property of vitamin C present in lime helps to remove toxins from the body. 5. Kiwi can be taken as fruit or juice as its potassium level balances electrolytes and vitamin C balances immunity.
- Pomegranate juice help to enhance blood counts.

#### 5. Spices and condiments.

- Spices induce acidity since the liver function is impaired they are heavy and hard to digest during fever. Fried foods, fast foods and foods with condiments and spices are to be avoided.

#### 6. Herbal tea [15]

- Herbal tea prepared with Tulsi, Cardamom and Ginger helps with nutrient supplements of the compound
- Boiled tulsi taken as a warm drink like tea can help prevent the internal system against fever.
- Ginger is used in dengue fever to increase the immunity and reduce fever.
- Ginger tea with cardamom is an effective measure to enhance blood circulation as cardamom has anti-inflammatory properties.

#### 7. Fluid intake [16,17]

When patients are not comfortable with solid foods, liquid diet can be supplemented for 2-3 days after which solid food can be gradually started. Liquid diet need not be very light like dal water or rice kanji. Food pulp with water made to drinking consistency eg mashed dal rice or khichdi can be supplemented. Nausea and vomiting are the main symptoms of dengue fever which has to be taken care off.

- Fluid intake is very important point to keep in mind during dengue fever. Drinking fluid helps to remove toxins(virus) from the body via urine and prevents dehydration due to fever or vomiting.
- Patients should take other fluids which are nutrient rich like ORS, sugar cane juice, tender coconut water, lime juice, fresh orange juice and various fruit juices.
- High level of Sodium is needed to maintain plasma level, ORS help to maintain that level.

- The coconut water retrieves electrolytes and minerals lost by the body due to dehydration.
- Orange juice can help in digestion, in urinary output and enhances antibodies to act fast.
- Fresh carrot, cucumber and other green leafy vegetables juice are helpful to provide healthy nutrients for white blood cells and body recovery.
- Soups provides strength and help to fight with the pain in the joints. It helps to enhance hunger and improve the taste sensitivity by enhancing the taste buds in the mouth

### Conclusion

Dengue is an emerging disease in many parts of the tropics and subtropics of the world. This fever is

**Table 1 :** Sample Menu -Soft diet

Time	Menu
Early	Papaya leaf juice- 2tbs-6.00AM
Morning	Tea/ lemon tea/ milk -7.30AM
Breakfast	Idli/Idiappam/Puttu/Sandwich + Fruits (Apple, Banana, Orange, Pomegranate, Papaya, Kiwi) + Milk
Mid Morning	Coconut Water/ juices (apple, orange, pomegranate, mix)/ soups (spinach beetroot tomato, tomato)/ lemon water Herbal Tea( Tulasi)
Lunch	Vegetable soup-Starter Rice/Dhal/ green leafy vegetables/ paneer/ boiled egg + curd
Evening Tea	Tea/ lemon tea/ milk
Dinner	Dhal rice/Khichdi (combination of rice and pulses well-cooked)/ green leafy vegetables/ paneer /other vegetables + curd
Bed Time	Milk

known as break bone fever because it causes severe pain in the joints. The World Health Organization (WHO) approximates that about 2.5 billion people or 40% of the world's population live in dengue endemic countries. Diet plays a greater role in the recovery of dengue fever. Some foods have remarkable properties that can help the patient to a great extent. The basic diet principle to be followed are high protein, more and frequent liquids, non-oily non-spicy and soft food items which are easily digestible as the liver function is impaired.

*Conflict of interest:* Conflict of interest declared none.

### Key Messages

Diet plays a greater role in the recovery of dengue. Some foods have remarkable properties that can help the patient to a great extent such as papaya, herbal tea made from tulasi cardamom and ginger.

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